California's Drought Update

Nov 30, 2009

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Introduction

This drought bulletin provides a monthly update to California's water conditions. As we are nearing the beginning of the winter season, reservoir conditions have typically reached their lowest conditions after summer demands. The unseasonably early wet October storms did not significantly reduce our accumulated water supply deficit. As of November 23, rainfall in the Northern Sierra was only 29 percent of the average for total month of November. During the same period precipitation in the San Joaquin basin was 13 percent of the average for the total month of November. Information in this report is based on hydrologic data compiled through either the end of October, or through late November, depending on availability. This month's report includes updated information on hydrologic and water supply conditions presented in the October 2009 drought bulletin, local drought impacts, a discussion of historical drought periods, impacts by hydrologic region, and the status of drought emergencies declared by counties. Additional drought information can be found on the drought website, http://www.water.ca.gov/drought/.

Hydrologic and Water Supply Conditions

Precipitation

Precipitation in Water Year 2009 was the third consecutive below average year for the state. Water Year 2007-08 resulted in 63 percent of average annual precipitation across the state, and Water Year 2008-09 resulted in 76 percent of average annual precipitation. Table 1 gives the average monthly contribution to statewide precipitation as well as the figures from Water Year 2009. As Table 1 shows, January, April, July, August, and September were exceptionally dry. Current equatorial sea surface

temperature data indicates warm conditions well above the El Niño threshold. These conditions are expected to strengthen and continue through the current winter based on a November 5 report by the National Oceanographic and Atmospheric Administration.

Info source: http://www.wrcc.dri.edu/monitor/calmon/frames_version.html (select region=statewide, element=precipitation, time period=water year Oct-Sept)

WY 2009 Oct 1 - Sept 30	Avg CA Precip (inches)	WY 2009 Observed	% of Average	WY 2010 Oct 1 - Sept 30	Avg CA Precip (inches)	WY 2010 Observed	% of Average
October	1.22	0.73	60%	October	1.22	2.29	188%
November	2.80	2.49	89%	November			
December	3.91	3.05	78%	December			
January	4.35	1.25	29%	January			
February	3.66	5.06	138%	February			
March	3.12	2.13	68%	March			
April	1.64	0.59	36%	April			
May	0.89	1.50	169%	May			
June	0.35	0.47	134%	June			
July	0.18	0.03	17%	July			
August	0.28	0.06	21%	August			
September	0.48	0.09	19%	September			
Total	**22.88**	**17.45**	**76%**	**Total**			

Table 1. Average statewide precipitation by month, with current Water Year precipitation through October 30, 2009. Data from California Climate Tracker (Western Region Climate Center) based on National Weather Service Cooperative Observer data.

Reservoir Storage

Statewide reservoir storage at the end of Water Year 2009 was over 17 MAF or about 80 percent of average and 46 percent of capacity for the date, with individual key reservoirs much lower. Statewide reservoir storage at the end of October 2009 was 16.9 MAF which is about 80 percent of average and 45 percent of capacity. Figure 1 shows the condition of the state's larger reservoirs as of November 22, 2009.

Info source: http://cdec.water.ca.gov/cgi-progs/products/rescond.pdf or http://cdec.water.ca.gov/cgi-progs/reservoirs/RES/

CURRENT RESERVOIR CONDITIONS

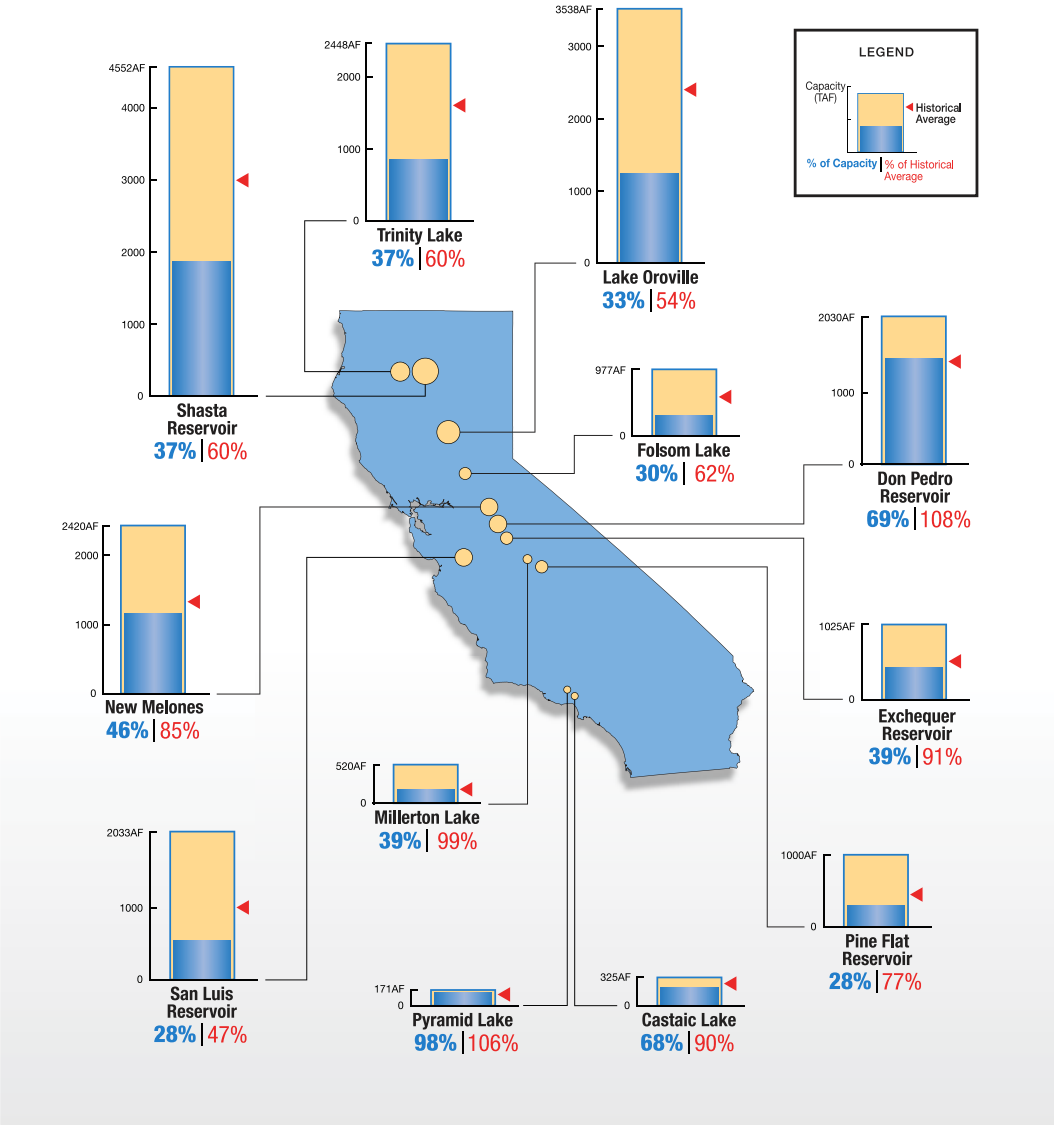

Figure 1. Reservoir storage for select reservoirs shown as percent of capacity (blue) and percent of average (red). The three-year drought, from 2006 to the present, is evident in the well-below normal storage readings. The state entered the Water Year 2010 with its key supply reservoirs only about half full.

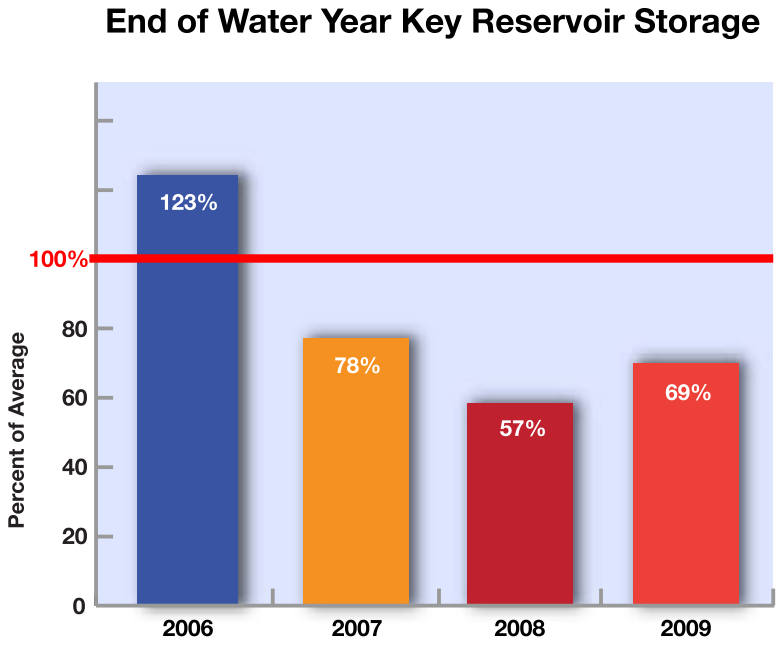

Figure 2. Percent of average end of water year storage for key reservoirs from 2006 to 2009. ("key reservoirs" comprise Trinity, Shasta, Oroville, Folsom, Don Pedro, New Melones, and San Luis reservoirs)

Figure 2 shows storage for key reservoirs for the end of the last four water years, including the end of this water year on September 30, 2009. The three-year drought, from 2007 to the present, was evident in the well-below normal storage readings. The state entered the 2009-2010 Water Year with its key supply reservoirs at only 69 percent of average. As of November 22, 2009, the summation of storage in the "key reservoirs" was 66 percent of average.

Runoff

Figure 3 shows a comparison of statewide runoff from 2006-09. Water Year 2005-06 was the most recent wet year in California, with 173 percent of average statewide runoff. Water Year 2006-07 was the first of three dry years, ending with 53 percent of average statewide runoff. The Sacramento River region was classified as "Dry," the second driest of five classification levels, and the San Joaquin River region was classified as "Critical," the driest level. Water Year 2007-08 ended with 60 percent of average statewide runoff, and both the Sacramento and San Joaquin River regions classified as "Critical." Water Year 2008-09 ended with 65 percent of average statewide runoff, and the Sacramento and San Joaquin river regions being classified as "Dry" and "Below Normal", respectively. At the end of October 2009, only one month into the water year, statewide unimpaired flow was 120 percent of average.

Info source: (http://cdec.water.ca.gov/cgi-progs/rpts1/FLOWOUT/)

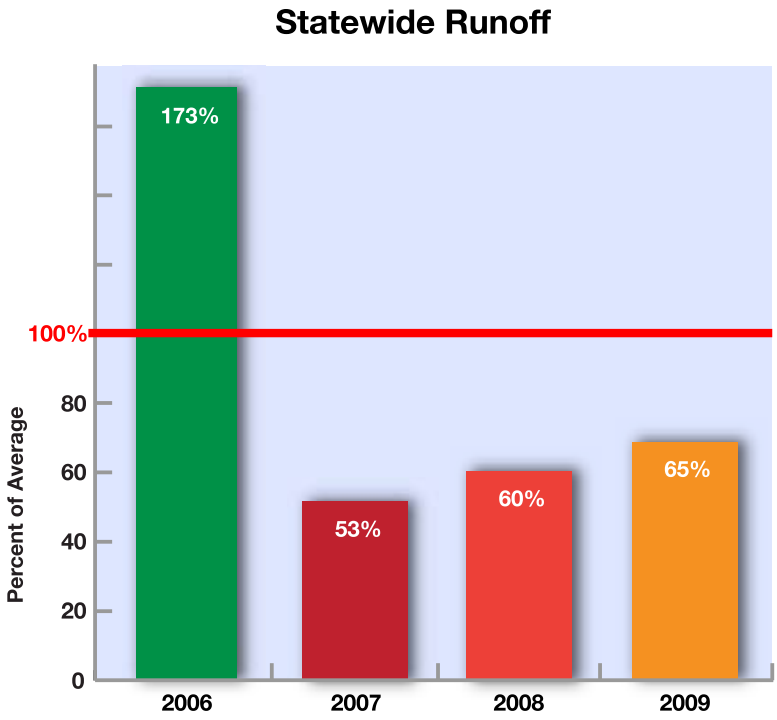

Figure 3. Statewide runoff for water years 2006, 2007, 2008 and 2009.

	Sacramento River			San Joaquin River		
WY	Runoff MAF	Index	Year Type	Runoff MAF	Index	Year Type
2006	32.09	13.2	W	10.44	5.9	W
2007	10.28	6.2	D	2.51	2.0	C
2008	10.28	5.1	C	3.50	2.1	C
2009	12.91	5.7	D	4.97	2.7	BN

Table 2. Sacramento and San Joaquin river runoff, WSI, and year type for select water years based on observed data (W=wet, D=dry, C=critical, BN=below normal)

The Sacramento River annual water year runoff averages 18.62 MAF using a 50 year averaging period from 1956 to 2005. This corresponds to an average water supply index (WSI) of 8.33. The average yearly runoff and WSI from the San Joaquin River is 5.96 MAF and 3.29. Table 2 shows the Sacramento and San Joaquin river runoff, WSI, and year type for select water years. Figures 4 and 5 compare historic inter-annual drought periods using the Sacramento Basin Water Supply Index and the San Joaquin Basin Water Supply Index.

Info Source: (http://cdec.water.ca.gov/cgi-progs/iodir/wsihist and http:// cdec.water.ca.gov/cgi-progs/iodir/b120 for WY2009/)

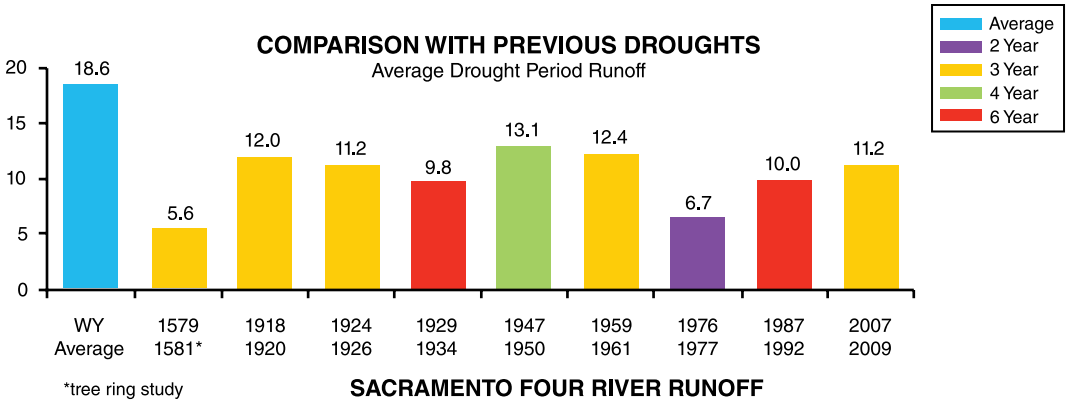

Figure 4. Historic inter-annual drought periods using the Sacramento Basin Water Supply Index for runoff from four rivers: Sacramento, Feather, Yuba, and American.

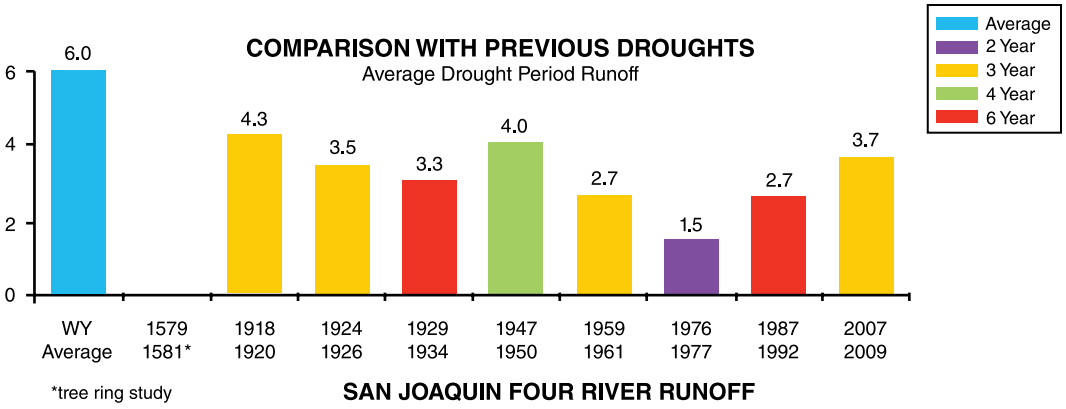

Figure 5. Historic inter-annual drought periods using the San Joaquin Basin Water Supply Index for runoff from four rivers: Stanislaus, Tuolumne, Merced, and San Joaquin.

Meteorology

As of October 31, 2009, statewide hydrologic conditions were as follows: precipitation, 188 percent of average to date; runoff, 120 percent of average to date; and reservoir storage, 80 percent of average for the date. Sacramento River water year unimpaired runoff observed through October 2009 was about 0.5 million acre-feet (MAF), which is about 100 percent of average. Last year, on October 31, the observed Sacramento River unimpaired runoff was about 0.3 MAF, or about 65 percent of average.

As of November 16, the Northern Sierra 8-Station Precipitation Index Water Year total was 5.3 inches, 83 percent of average. Last year on November 16, the seasonal total to date was 8.42 inches, 132 percent of an average for the date . Water Years 2007–2009 were the 13th driest consecutive 3-year period (tied with Water Years 1976-1978) out of 87 years of record.

The latest National Weather Service Climate Prediction Center (CPC) weather outlook for December through February, issued November 15, 2009, forecasts above average precipitation for all of California.

Climatology

Water year 2009 ended with slightly below normal conditions in terms of precipitation and well below average runoff. Statewide, precipitation was 76 percent of average. The northern California 8-station index fared better recording 93 percent of average conditions. Statewide runoff was only 65 percent of average, while the Sacramento River's 12.9 million acre feet of runoff was about 70 percent of average. The Sacramento Runoff Index was classified as Dry, and the San Joaquin River Runoff Index was classified as below normal. Only three times last century did northern California droughts extend beyond three years.

Groundwater Basin Conditions

Groundwater levels were measured in October 2009 in the northern Sacramento Valley and Redding Basin. The data from this fall's groundwater level measurements were compared to fall 2008 (a dry year) and fall 2006 (a wet year), and graphed in the chart below, Figure 6. The data shows that groundwater levels are about a foot lower on average this fall than they were last fall in October 2008 (red bars). It also shows that groundwater levels are about six feet lower this fall than they were in October 2006, which was the last wet year in the Sacramento Valley and Redding Basin (blue bars).

The greatest decline in groundwater levels are in Colusa County (2 feet) when comparing data from fall 2009 to fall 2008, and in Glenn County (almost 10 feet) when comparing data from fall 2009 with fall 2006, with the Redding Basin showing the least amount of decline over both time period comparisons. However, in Butte and Tehama counties, groundwater levels are slightly higher this October than they were in October 2008. These averages are based on the difference in groundwater levels as measured in the same wells during the October semi-annual measurements.

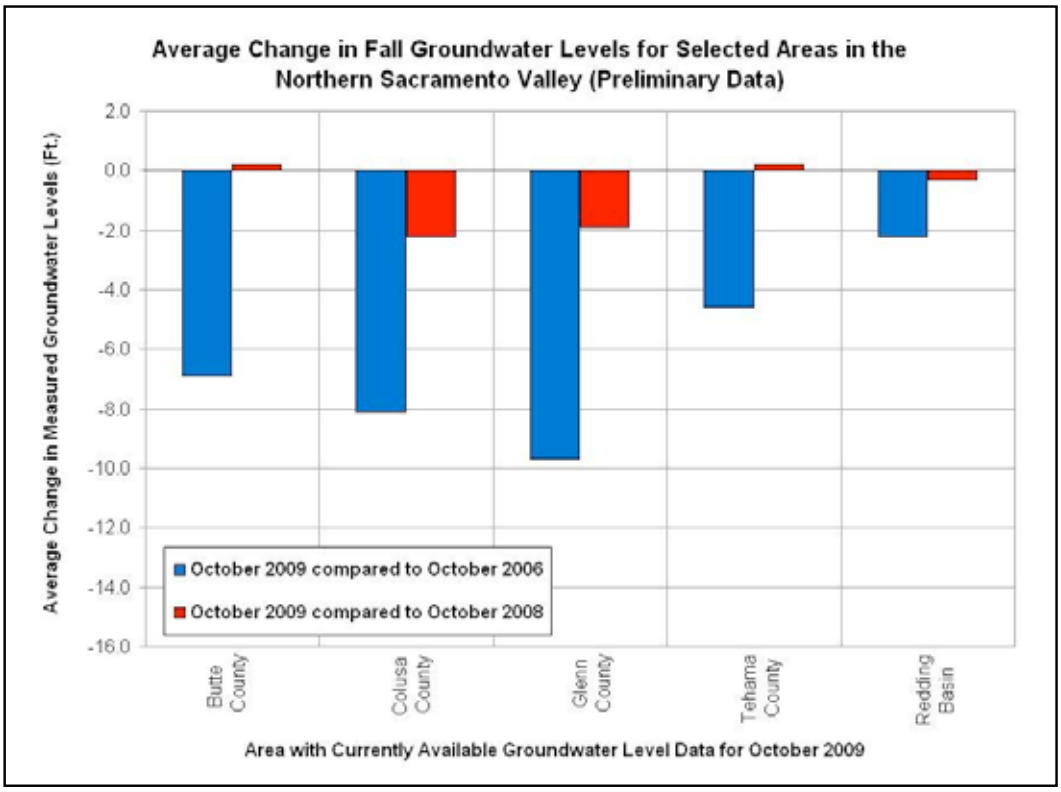

Figure 6. Average Change in Fall Groundwater Levels in the Northern Sacramento Valley

In the southern Sacramento Valley semi-annual groundwater level measurements for Fall 2009 were also collected in October. Some of this data is currently available on the DWR Water Data Library, while much of this data is still being processed and is not yet available. Comparison of the available data shows that on average groundwater levels in Fall 2009 are similar to fall 2008 in much of the lower Sacramento Valley, and that these levels are still distinctly lower than Fall 2006, prior to the current three-year drought. As shown in the chart below, Figure 7, average water levels in Sacramento and Solano Counties are relatively unchanged when compared to last year (Sutter County shows about two feet of recovery, while Yolo County groundwater levels are about three feet lower than Fall of last year). Compared to Fall 2006, Fall 2009 average groundwater levels are about four feet lower in Sacramento County, eight feet lower in Solano and Sutter Counties, and 15 feet lower in Yolo County. As with the northern Sacramento Valley, these averages are based on the difference in groundwater levels as measured in the same wells during the October semi-annual measurements.

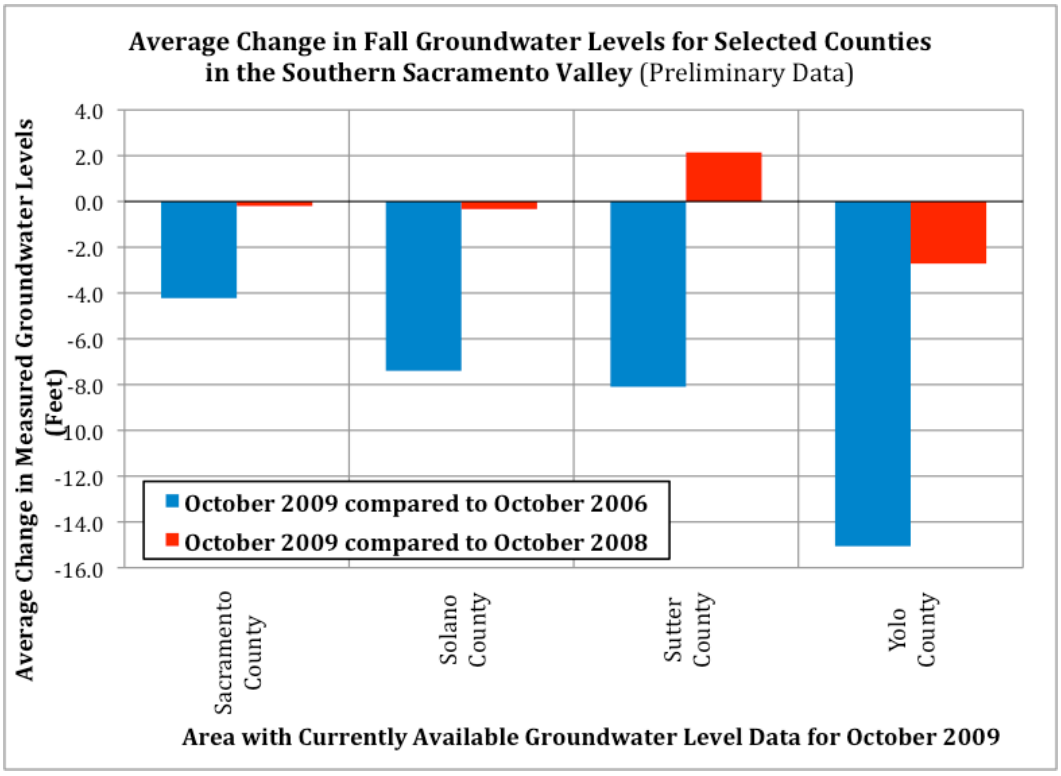

Figure 7. Average Change in Fall Groundwater Levels in the Southern Sacramento Valley

Local Impacts and Responses to the Drought

On November 13, 2009 the U.S. Department of Agriculture (USDA) designated Lassen County in California as a primary natural disaster area because of losses caused by drought which have occurred since January 1, 2009. As reported in the October 30 Drought Bulletin, Lassen County had not been approved as a primary or contiguous disaster area. As of November 13, 2009, the USDA had granted agricultural disaster designations, either primary, contiguous, or both due to drought, for 53 of California's 58 counties. Farm and ranch operators in Modoc, Plumas, Shasta and Sierra counties also qualify for natural disaster assistance because their counties are contiguous to Lassen County. Qualified operators in the designated areas are eligible for low interest emergency loans from USDA's Farm Service Agency (FSA), provided eligibility requirements are met. Information on the USDA disaster assistance program can be found at: http://disaster.fsa.usda.gov.

This year's drought and water shortages have severely impacted agriculture on the west side of the San Joaquin Valley. Westlands Water District officials estimate that about 260,000 acres in their district were fallowed this year, due to the effects of the natural drought and environmental restrictions on water deliveries. Thousands of additional acres were switched to lower value, low water use crops, such as wheat and safflower; and several thousand acres of almonds and pomegranates were abandoned, due to the water cut backs. The Del Puerto Water District's 2009 cropping data indicate that 13,207 acres were fallowed this year. This represents about 30 percent of the District's normally farmed acreage. Kern County Water Agency officials estimate that during 2009 Kern County farmers have fallowed 40,000 acres of crops, and are under-irrigating an additional 48,000 acres.

North Coast Hydrologic Region--- On November 10th, 2009, Mendocino County Board of Supervisors amended an ordinance requiring a 50 percent mandatory rationing requirement on communities affected by Lake Mendocino water. The ordinance is effectively suspended, but can be re-imposed if the Lake drops below the 30,000 AF level.

Mendocino County Water Agency reported they are putting together a list of State Licensed potable water "haulers" for emergency water needs, developing a Drought Action Plan in the event the drought continues, and working with local businesses and municipalities to pay for the maintenance of USGS gaging stations on two coastal rivers, which will help in monitoring and planning.

North Lahontan Hydrologic Region---Lake Tahoe's water level dropped below its natural rim (elevation 6223 feet) on October 28, 2009. The last time it dropped below its natural rim was during the fall of 2004. It dropped nearly 3 feet below its rim in 1992 at the end of six years of drought. Once it drops to this level no significant releases can be made to the Truckee River from Lake Tahoe. Since Boca

Reservoir storage is also low, flows into Nevada, at Farad, have dropped below 100 cubic feet per second, closing the run-of-the-river power generators. Sufficient water continues to flow through Reno/Sparks to meet their current municipal and industrial (M&I) water needs. Revised management using M&I storage in Independence Lake and Stampede Reservoir will become necessary if this winter/spring is dry.

Sacramento River Hydrologic Region---Groundwater level data in the Sacramento Valley for the fall period is currently being collected and evaluated by DWR. See the Groundwater Conditions section for a discussion of preliminary data. A more detailed analysis and discussion of groundwater conditions will be available early next year.

The Westside Regional Water Management Group (WRWMG) reported Solano County is not yet in a drought mode. Lake Berryessa is at 62 percent of capacity and has no water supply reductions. State Water Project supplies have been reduced but Lake Berryessa supplies will cover shortages this year. There were no significant changes in groundwater levels.

The WRWMG reported the Yolo County is concerned about lack of carryover storage in Clear Lake and Indian Valley reservoirs and corresponding increases in groundwater pumping. The Yolo County Flood Control and Water Conservation District started the 2009 irrigation season with 17 percent of full availability from Clear Lake and 11 percent availability from Indian Valley Reservoir and delivered about 10 percent of the normal amount of water. The Dunnigan Water District started the 2009 water year with zero allocation from the Bureau of Reclamation, but was later increased to 40 percent in May following a substantial spring rainfall.

The Sacramento Regional Water Authority provided the results of a drought survey including 20 Sacramento County water purveyors and Placer County Water Agency. Some mandatory restrictions are being placed on outside irrigation by a few of the agencies. The restrictions focus on time-of-day or day-of-the-week irrigation. All the purveyors are still asking for voluntary water conservation from their customers.

Tulare Lake and San Joaquin River Hydrologic Regions---DWR is collecting groundwater elevations during the fall from all wells this year, in contrast to most years where only a portion of the approximately1600 wells are measured during this period and usually only in the southern Tulare Lake region. Previously all wells were only measured in the spring. Most of the local water districts that normally send groundwater elevations directly to DWR plan on measuring their wells during the fall. The USBR and their cooperating water districts will also be measuring all of their wells during the fall.

South Coast, South Lahontan, and Colorado River Hydrologic Regions ---Shorter showers and cutbacks on landscape irrigation are affecting local water consumption, representatives for the Carlsbad Municipal Water District said in new district staff report. Water usage in July and August were down 14 percent regionally when compared to a year earlier, according to the report that was released last week. Because of the drop, the district is asking its board of directors to ease its Level 2 drought conservation measures by amending its water conservation ordinance to allow outdoor watering schedules according to water conservation needs rather than prescribed days and times. This move will provide greater flexibility in how to meet water conservation goals.

Conservation efforts across San Bernardino County have had measured success. Water use in the Monte Vista Water District in Montclair has dropped 12 percent since last July and 19 percent over the last five year average. Consumption in the city of Pomona, which uses mostly groundwater accumulated within the city, has declined by 12 percent. This decline has been primarily achieved through reductions in outdoor water use.

According to the Los Angeles Department of Water and Power, a series of water main breaks in the water distribution system this past summer were caused by corroded pipes and operational changes, routine and in part due to changes necessitated by prior leaks, which may have triggered other leaks in pipes that were on the verge of failing. Furthermore, the higher percentage of blowouts during the same period appears to be the result of a higher percentage of breaks on cast iron pipes which often take the form of longitudinal splits or ruptures which result in larger leaks. The agency also found no evidence that pressures increased and no clear correlation exist between watering days and the occurrence of main breaks as a result of the 2-days per week outdoor watering restriction imposed before summer.

Water Conservation Actions by Local Water Agencies

As of November 23, 2009, there are 67 local water agencies in California that have mandated water conservation and 56 water agencies urging voluntary conservation measures. A current update of the number of agencies mandating conservation and urging voluntary conservation measures can be found at the Association of California Water Agencies (ACWA) website, http://www.acwa.com/issues/cadrought/.

Dual Plumbing Standards

The Building Standards Commission unanimously voted to approve the California Dual Plumbing Code which delineates statewide standards to install both potable and recycled water plumbing systems in certain types of buildings. The Code applies to commercial, retail, and office buildings, theaters, auditoriums, condominiums, schools, hotels, apartments, barracks, dormitories, jails, prisons, and reformatories as determined by the State Department of Public Health. Recycled water can be used for floor trap priming, cooling towers, air-conditioning, and toilet and urinal flushing.

Humboldt County Drought Emergency Declaration

The Redway Community Services District (RCSD) is currently relying on mandatory water conservation and a temporary pump installed in the South Fork Eel River to meet current demands while it seeks funding and approvals for improvements to their system. RCSD is awaiting approval of an Army Corps of Engineers 1602 permit. The National Marine Fisheries Service has been consulted and given approval.

Construction will not be allowed until after July 1st of next year due to the presence of endangered /threatened species. The permit requires consultation from the National Marine Fisheries Service. Funding for improvements to their system is expected to be granted upon approval of the final design and specifications by California Department of Public Health.

Planning for a Dry 2010

DWR continues to work on actions to prepare for the possibility California's drought continuing into 2010 and beyond. These include increased water conservation, 2010 water transfers, a long-term water transfer program, improvements to the California Irrigation Management Information System, and improved coordination of emergency response activities.

At the November 3, 2009 Winter 2010 Outlook Workshop, DWR hosted research meteorologists and climate scientists from the USGS/Scripps Institute, the University of Colorado, Western Regional Climate Center, Jet Propulsion Laboratory and the National Weather Service. A webcast of the workshop can be found on the DWR website, http://www.water.ca.gov/drought/conditions. Assessments given at the workshop include:

- Current classification of growing El Niño / neutral PDO (Pacific Decadal Oscillation) gives southern CA best chances for a wet season, while the odds for moisture improve in all of CA if this El Niño maintains current strength or were to get stronger. If the PDO slips back into the negative phase this winter, the El Niño associations could be disrupted again. (Klaus Wolter, University of Colorado)
- Developing El Niño bodes well. However, El Niño has a much wider range of historical streamflow outcomes than La Niña in most of California, so we could still be disappointed. (Mike Dettinger, USGS/Scripps Institute)

For more information on Planning for a Dry 2010, see our DWR link on Drought Planning and Preparedness at http://water.ca.gov/drought/planning.cfm/ .

Drought Contingency Plan

DWR and the California Water Plan state agency steering committee are working on a draft of a 5-year Statewide Drought Contingency Plan. The purpose of the plan is to articulate a coordinated State government strategy for preparing for, responding to, and recovering from drought. DWR is currently incorporating comments received

on an outline of the draft presented at the California Water Plan Plenary on October 14 and from the Water Plan Steering Committee. A draft plan will be completed during December, and a final plan will be released in conjunction with the next water plan update due in February 2010.

Summary

The current drought period beginning in 2007, has left a significant deficit in our reservoir's carry-over supplies. Based on storage for key reservoirs at the end of the last three water years, the state entered the 2009-2010 Water Year, beginning October 1, with its key supply reservoirs at only 69 percent of average and 42 percent of capacity. Water Year 2008-09 ended with 65 percent of average statewide runoff, with the Sacramento region Water Supply Index (WSI) classified as "Dry" and San Joaquin River region WSI classified as "Below Normal". At the end of October 2009, statewide unimpaired flow was 120 percent of average due to October storms that caused a brief increase in river flows. While the recent cumulative water supply deficits from below average rainfall and runoff are not as deep as some past severe droughts and the runoff at the end of October was above average, California's upcoming winter season is uncertain, so the State continues to prepare for the possibility of a dry 2010.